REMARKS

Claims 1-19 are presently pending in this application. Claims 1-3 and 10-19 have been amended to more particularly define the claimed invention.

It is noted that the amendments are made only to more particularly define the invention and **not** for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability. It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Claims 1-19 are rejected under 35 U.S.C. § 101 for nonstatutory subject matter. Applicant respectfully traverses this rejection.

Examiner alleges Applicant's invention is ineligible because it is for a vehicle motion model. However, Applicant contends that the "*vehicle motion model generating device... outputting...a parameter indicating said motion state of the vehicle*," is a useful, concrete and tangible result. The focus must be on the result of the claim as a whole, not the individual steps or structure used to produce the result. This useful, concrete and tangible result is specifically recited in each of the independent claims.

A usefulness of this result, the *parameter indicating a motion state of the vehicle*, may include enhancing the operational stability of vehicles by estimating the operational stability of a vehicle by analyzing the behavior of the vehicle in a motion state or a vehicle motion state based on an approximating vehicle motion model. (Specification at page 1, lines 13-25.)

The claimed invention additionally produces a concrete result in that the *parameter indicating said motion state of the vehicle* may be reproducible since it is an approximation

based on the actual motion state of the vehicle. Here, the data processed is not subjective but is the actual motion state of the vehicle and the data generated from the calculations used in conjunction with the data of the actual motion state of the vehicle.

Finally, the *parameter indicating said motion state of the vehicle* fails to fall into any 35 U.S.C. § 101 judicial exception as merely an abstract idea or mathematical algorithm. *The vehicle motion model generating device outputs a parameter* ***indicating*** *said motion state of the vehicle*, that is used to enhance the operational stability of vehicles having vehicle stabilization systems.

Applicant respectfully requests the Examiner to reconsider and withdraw this rejection.

Claims 13-19 are rejected under 35 U.S.C. §112, first paragraph. Applicant respectfully traverses this rejection.

The Examiner alleges, "there is no mention on the connections between the recurrent neural network and the genetic algorithms and what process happens at what location during time 'T'."

The Examiner is clearly incorrect. Indeed, Applicant directs the Examiner to the following exemplary passages in Applicant's specification, *inter alia*, which clearly enables these claims:

> The optimizing unit 10 carries out an operation based on a learning rule using a genetic algorithm, and outputs predetermined parameters as an operation result to the vehicle motion model unit 20. As described later, these parameters correspond to a coupling weight coefficient Kij of a recurrent neural network and a threshold value θj, since each of estimating modules 21 to 24 constituting the vehicle motion model unit 20 is constructed by the recurrent neural network. Here, "the recurrent neural network" means a neural network having a feedback loop. (Specification at page 11, lines 6-16.)
>
> Fig. 3 is a flowchart showing the procedure of determining the optimum

> solution of the weight coefficient wij and the threshold value θj by using the genetic algorithm. The processes shown in Fig. 3 are carried out by the optimizing unit 10. The optimizing unit 10 carries out the following processes on each of the estimation modules 21 to 24. (Specification at page 16, lines 19-24.)

Applicant respectfully requests the Examiner to reconsider and withdraw this rejection.

Claims 16-18 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicant respectfully traverses this rejection.

Claim 13 recites "a first recurrent neural network," and claim 16 recites, "a second recurrent neural network." Claim 13 and 14 recite, a/said "first recurrent neural network," and claim 17 recites, "a second recurrent neural network." Finally, claim 13 and 15 recite, a/said "first recurrent neural network," and claim 18 recites, "a second recurrent neural network." Applicant fails to understand how the term, "a second recurrent neural network," in claims 16-18 fails to provide insufficient antecedent basis, and Applicant respectfully requests the Examiner to reconsider and withdraw this rejection.

Claims 13-18 stand rejected under 35 U.S.C. §102(b) as being unpatentable over Kamihira, U.S. Pat. Pub. No. 2002/0045958.

Claims 1-3, 5, 7, 9 and 11-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kamihira, U.S. Pat. Pub. No. 2002/0045958, further in view of Mehrotra, "Elements of Artificial Neural Networks".

Claims 4, 6 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kamihara and Mehrotra, further in view of Fujita, U.S. Pat. Pub. No. 2002/0158599.

Claim 19 stands rejection under 35 U.S.C. § 103(a) as being unpatentable over Kamihara further in view of Minowa, U.S. Pat. No. 6,397,140, (Minowa) and Kimoto, U.S.

Pat. No. 5,579,442, (Kimoto).

These rejections are respectfully traversed in view of the following discussion.

I. APPLICANT'S CLAIMED INVENTION

The claimed invention (as defined, for example, by independent claim 1) is directed to a vehicle motion model generating device for generating a vehicle motion model that represents a motion state of a vehicle, including, a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a loop feeding back an output of at least one node to at least one of the one node and a node other than the one node, and an optimizing unit for determining an optimum solution of the coupling weight coefficient in the first recurrent neural network based on a learning rule using a hereditary algorithm, wherein the first recurrent neural network outputs a first parameter indicating the motion state of the vehicle based on predetermined input information, thereby functioning as the vehicle motion model.

Conventionally, in the neural network, adjustment (or learning) of the coupling weight coefficient is carried out in advance according to an algorithm such as back propagation so that the output corresponds to a teaching signal. (Specification at page 3, lines 5-8.)

Additionally, when a vehicle motion model is set, a motion equation is linearly approximated to avoid cumbersome operation processing in the solution calculating process. Therefore, the vehicle motion model may not accurately represent the motion state of the vehicle, that is, the behavior of the vehicle in a non-linear region. (Specification at page 3, lines 10-15.)

Furthermore, in a feed-forward type neural network is used, the value output from the neural network and the value input to the neural network are independent of each other. Thus, the motion state of the vehicle may not be accurately represented in such a neural network. In particular, the values output from the neural network are varied in accordance with not only the input, but also the value thereof at the present time (a present value). Consequently, it is necessary to feed back the output value and reflect the output value to the neural network, in order to estimate the motion state of the vehicle with high precision. However, the neural network having such feedback has a problem that the coupling weight coefficient cannot be learned according to the principle of a learning rule such as back propagation. Thus, accurate estimation of the road surface friction coefficient is hardly achieved. (Specification at page 3, line 16 to page 4, line 11.)

The claimed invention (e.g., as recited in claims 1 and 11-13), on the other hand, provides *a novel method of creating a motion model of a vehicle* by using a recurrent neural network containing a feedback loop, specifically, "*a first recurrent neural network formed by connecting plural nodes such that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient, comprising a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node.*"

II. THE ALLEGED PRIOR ART REJECTIONS

A. 35 U.S.C. § 102(b) Rejection over Kamihira, U.S. Pat. Pub. No. 2002/0045958

The Examiner alleges that Kamihira, U.S. Pat. Pub. No. 2002/0045958, (Kamihira), teaches the invention of claims 13-19.

Applicant submits, however, that Kamihira does not teach or suggest:

"a method for generating a vehicle motion model that represents a motion state of a vehicle, wherein a first recurrent neural network being formed by connecting plural nodes so that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient and includes a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node, said method being executed by a computer, said method comprising:

wherein said first recurrent neural network outputs a parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model."

First, Applicant respectfully traverses the Examiner's allegation that Applicant's *vehicle motion* is equivalent to controlling a vehicle engine of Kamihara, since there is no teaching or suggestion in Kamihara that controlling a vehicle engine is equivalent to *a method for generating a vehicle motion model that represents a motion state of a vehicle*. Kamihara states:

> [0038] With reference to FIGS. 2 to 13, an apparatus for customizing overall characteristics that is applied for controlling a vehicle engine will be described. (Emphasis added.)

Further, Kamihara fails to teach or suggest and the Office Action fails to address, "*a first recurrent neural network being formed* ***by connecting plural nodes*** *so that an output of a node* ***is input to another node***."

Further, Kamihara fails to teach or suggest and the Office Action fails to address, "***a*** *loop feeding back* ***an output*** *of at least one node* ***to*** *at least one of said one node* ***and*** *a node other than said one node*." Kamihara teaches:

> A machine 1 is manipulated by a user 6 using a control module 2 via an interface 4. Performance of the machine 1 is controlled essentially by the

> control module 2 having an input-output relationship regulated by control parameters. Initial values of the control parameters can be pre-selected, and the machine 1 is activated with the initial values. The performance of the machine 1 is evaluated by the user 6. This feedback loop (the user 6→the interface 4→the control module 2→the machine 1→the user 6) is found in conventional operation. ... This second loop (the machine 1→the user 6←→the interface 5←→the parameter module 3→the control module 2→the machine 1) allows the user 6 to customize the control module in real time. (Paragraph [0032].)

There is no teaching or suggestion in Kamihara about either feedback loop found in paragraph [0032] of *feeding back an output of at least one node to at least one of said one node* ***and*** *a node other than said one node.*

Furthermore, Kamihara fails to teach or suggest, "*said first recurrent neural network outputs a parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model.*" Since Kamihara fails to teach or suggest a vehicle motion model, but rather an engine control system, Kamihara fails to teach or suggest *outputting a parameter indicating a motion state of the vehicle.*

In Kamihara, the target of feedback is not the output value of the neural network itself, but a condition value of a control target which is activated by the output value of the neural network. Therefore, the feedback mechanism of Kamihara is different from the claimed invention.

Additionally, the neural network in Kamihara inputs a throttle property of an electric control throttle, and thus, Kamihara does not disclose or suggest the claimed neural network functioning as a vehicle motion model. Therefore, the neural network in Kamihara does not relate to a vehicle motion model, but to a throttle property.

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

B. 35 U.S.C. § 103(a) Rejection over Kamihira, U.S. Pat. Pub. No. 2002/0045958 further in view of Mehrotra, "Elements of Artificial Neural Networks"

The Examiner alleges that Kamihira, further in view of Mehrotra, "Elements of Artificial Neural Networks", (Mehrotra), teaches the invention of claims 1-3, 5, 7, 9 and 11-12.

Applicant submits, however, that Kamihira further in view of Mehrotra does not teach or suggest:

"*a vehicle motion model generating device for generating a vehicle motion model that represents a motion state of a vehicle*," (from Applicant's claim 1);

"*a road surface friction coefficient estimating device for estimating a road surface friction coefficient based on a vehicle motion model that represents a motion state of a vehicle and is generated by a vehicle motion model generating device*," (from Applicant's claim 11);

"*a vehicle behavior estimating device for estimating a behavior of a vehicle based on a vehicle motion model that represents a motion state of a vehicle and is generated by a vehicle motion model generating device*," (from Applicant's claim 12); and,

"*wherein said first recurrent neural network outputs a first parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model*," (from Applicant's claims 1, 11 and 12).

Kamihira, as argued above, and Mehrotra fail to teach or suggest *generating* or *estimating* anything *that represents a motion state of a vehicle*. Controlling a vehicle engine has taught by Kamihira, is not equivalent to Applicant's:

(1) *generating a vehicle motion model*;

(2) *estimating a road surface friction coefficient based on a vehicle motion model*; or

(3) *estimating a behavior of the vehicle based on a vehicle motion model;*

that represents a motion state of a vehicle.

Furthermore, neither Kamihira nor Mehrotra teach or suggest, a "*first recurrent neural network outputs a first parameter* ***indicating said motion state of the vehicle*** *...thereby functioning as said vehicle motion model.*"

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

C. 35 U.S.C. § 103(a) Rejection over Kamihara and Mehrotra further in view of Fujita, U.S. Pat. Pub. No. 2002/0158599

The Examiner alleges that Kamihara and Mehrotra, (Kamihara and Mehrotra), further in view of Fujita, U.S. Pat. Pub. No. 2002/0158599, (Fujita), teaches the invention of claims 4, 6 and 8.

Applicant submits, however, that Kamihara and Mehrotra further in view of Fujita does not teach or suggest, "*a vehicle motion model generating device for generating a vehicle motion model that represents a motion state of a vehicle*, and *wherein said first recurrent neural network outputs a first parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model*," as argued above with respect to Applicant's independent claim 1.

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element

and feature of Applicant's claimed invention.

D. 35 U.S.C. § 103(a) Rejection over Kamihara further in view of Minowa, U.S. Pat. No. 6,397,140 and Kimoto, U.S. Pat. No. 5,579,442

The Examiner alleges that Kamihara further in view of Minowa, U.S. Pat. No. 6,397,140, (Minowa) and Kimoto, U.S. Pat. No. 5,579,442, (Kimoto) teaches the invention of claim 19.

Applicant submits, however, that Kamihara further in view of Minowa and Kimoto does not teach or suggest, "*a method for generating a vehicle motion model that represents a motion state of a vehicle, wherein a first recurrent neural network being formed by connecting plural nodes so that an output of a node is input to another node in accordance with a predetermined coupling weight coefficient and includes a loop feeding back an output of at least one node to at least one of said one node and a node other than said one node,*" and "*wherein said first recurrent neural network outputs a parameter indicating said motion state of the vehicle based on predetermined input information, thereby functioning as said vehicle motion model,*" as argued above with respect to Applicant's claim 13.

Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-19, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: July 13, 2006

Donald J. Lecher, Esq.
Reg. No. 41,933
Sean M. McGinn, Esq.
Reg. No. 34,386

McGinn Intellectual Property Law Group, PLLC
8321 Old Courthouse Rd., Suite 200
Vienna, Virginia 22182
(703) 761-4100
Customer No. 21254